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**FEB 27 2007**

Docket No.: 0941-0844P  
(PATENT)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of:  
Steve LEE et al.

Application No.: 10/668,220

Filed: September 24, 2003

For: METHOD FOR PREVENTING READ  
ERRORS IN OPTICAL DISC DRIVE

Confirmation No.:

Art Unit: 2133

Examiner: S. A. Chase

**LETTER PERFECTING CLAIM FOR PRIORITY UNDER 37 CFR 1.55(a)**

MS Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

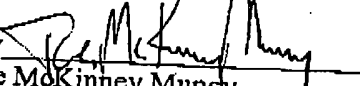
Sir:

Enclosed please find a verified English translation of Taiwan priority document No. 091121854 filed on September 24, 2002, for which the Applicant hereby perfects the claim for priority under Rule 55(a).

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Dated: February 27, 2007

Respectfully submitted,

By   
Joe McKinney Muncy  
Registration No.: 32,834  
BIRCH, STEWART, KOLASCH & BIRCH, LLP  
8110 Gatehouse Road  
Suite 100 East  
P.O. Box 747  
Falls Church, Virginia 22040-0747  
(703) 205-8000  
Attorney for Applicant

Birch, Stewart, Kolasch & Birch, LLP

*AKM/ASC/asc*

**CERTIFICATE OF TRANSLATION**

I, Ti-Kuo LIU, of TOP TEAM INTERNATIONAL PATENT & TRADEMARK OFFICE located at 3<sup>rd</sup> Fl., No. 279, Sec. 4, Hsin-Yi Rd., Taipei, Taiwan, R.O.C, hereby declare that I am the translator of the attached Taiwan priority document no. 91121854, filed on September 24, 2002, and certify that the following is a true translation of the document to the best of my knowledge and belief.

Signature of Translator Ti-Kuo Liu  
Ti-Kuo LIU

Dated this 8<sup>th</sup> day of February, 2007

Enclosure: translation of Taiwan priority document no. 91121854.

Header. :91039  
Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121854

**TITLE****METHOD FOR PREVENTING READ ERRORS IN OPTICAL DISC DRIVE****ABSTRACT**

A method for preventing data reading error, the method  
5 comprising: determining a read mode; if the read mode is an  
audio/video play mode, executing a first read procedure to  
read the data on the disk; if the read mode is a read mode,  
executing a second read procedure to read the data on the  
disk; and outputting the data.

10

**DISCRIPTION OF THE INVENTION**

The invention relates to a method for preventing data  
reading error in an optical disc drive, and particularly to  
a method for preventing audio disc reading error, having a  
two read procedures to prevent display segmentation and  
15 prevent disc burn failure from data reading error and buffer  
data shortage.

In digital technology age, quality of data process and  
storage of computer is increased. Although hard disc  
producers improve quality, capacity, speed, reliability of  
20 hard disc, user suffers expense when not copy or reserve  
important data in time. Not only suffering data lost,  
manpower, time and cost are required to rebuild the data.  
To solve this predicament, compact disc (CD), CD-ROM drive  
and CD burner has had significant advance in the evolution  
25 of data storage. With the development of optical storage  
media, data can be recorded and backed up into optical disks  
with high capacity, small volume, light weight, easy to

Header. : 91039

Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121854

carry, easy to write and high reliability, which has been replacing hard disc to store important data. Furthermore, the optical storage media has superior quality for audio and video data, which is a milestone in audio and video  
5 technology.

Fig. 1 shows a block diagram of a disc servo system in an optical disc drive as an example. An optical head 11 reads reflected signals from an optical disc 10. Being amplified and processed by the RF (Radio Frequency) IC 12, the FE (Focus Error) signal, TE (Track Error) signal and relative data and signals as read are input to DSP (Digital  
10 Signal Processor) and microprocessor 13. After analyzing the received signals, the microprocessor 13 accordingly generates and outputs signals to corresponding servos  
15 (Focusing Servo 14, Tracking Servo 15 and Spindle Motor Servo 16) to control the actuators (focusing actuator 17 and tracking actuator 18), sled motor 19 and spindle motor 20 and to ensure data accuracy during reading or writing.

Damaged tracks on the optical disc and defocus of the  
20 laser beam from the optical head 11 occur while read data on the optical disk. These events cause readout data from the optical disk as inaccurate or unacceptable. Thus, there is a need to prevent data reading error.

Traditionally, the method for preventing data reading  
25 error, as reading video track, comprises the following steps shown in Fig. 2. First, in an initial mode, the optical disc drive reads data from an optical disc (step S1). When the data cannot be read (or is unacceptable as read) and a buffer for temporarily storing readout data stores a  
30 sufficient amount of data for output (step S2), the data is

Header. :91039

Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121854

reread (step S1). When the data is read correctly (in other words, acceptable) or the buffer has an insufficient amount of data for output, the data is compulsorily written into the buffer (step S3). Eventually, the data is output (step  
5 S4) from the buffer.

Generally, if the optical disc drive is in a read mode, there is no time constrain. Nevertheless, when the optical disc drive is in an audio/video play mode (playing an audio/video program from an optical disk), time constrain  
10 must be considered. The reason is that audio/video play must be continuous without break, which provides user smooth enjoyment quality. Good audio/video play quality requires two requirements: first, data reading accuracy and data play accuracy to provide accurate audio/video play, and second,  
15 smooth play with no break. However, when conventional optical disc drive reading audio/video disc, for satisfying the first requirement, more time is wasted to read data accurately, and break occurs in music play.

The invention provides a method for preventing data  
20 reading error, comprising the following steps: determining a read mode; if the read mode is an audio/video play mode, executing a first read procedure to read the data on the disk; if the read mode is a read mode, executing a second read procedure to read the data on the disk; and outputting  
25 the data.

The first read procedure comprises the following steps: reading and determining a data; when the data is read correctly, the data is outputted to play; when the data is read incorrectly and the buffer has buffer data for output,  
30 the data is reread; re-determining the data in the reread

Header. :91039

Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121854

process; when the data is read correctly, the data is  
outputted to play; when the data is incorrect, the reread  
steps lower a predetermined limit, and the buffer has buffer  
data for output, the first read procedure is performed again  
5 to reread the data; when the reread steps over a  
predetermined limit, the data is output to play; when the  
buffer has insufficient buffer data for output, the data is  
output to play to prevent sound break.

As well, the second read procedure comprises the  
10 following steps: when the data is read correctly in first  
read, the data is outputted to be copied; when the data is  
read incorrectly, the data is reread; re-determining the  
data in the reread process; when the data is read correctly,  
the data is outputted to be copied; when the data is  
15 incorrect, the reread steps lower a predetermined limit,  
the data is reread again; when the reread steps over a  
predetermined limit, the data is output to be copied.

In the invention, the read process of the music disc is  
defined in two modes. First, audio/video play mode, for  
20 example, in playing music or movie, the invention prevents  
audio output interruption. As a result, when data read  
error happens, it is important to ensure that the buffer has  
sufficient data for output during the data reread step. When  
the buffer has insufficient buffer data for output, the data  
25 read incorrectly must be driven to output. Although data  
read errors negatively affect tone quality, it is preferable  
and unobvious to interruptions in output.

Second, in copy mode, for example, when copy data from  
a disc storing music or movie, since the data is  
30 successively stored on the disc, the copy mode of the

Header. :91039  
Our ref: 0660-8318 US/literal translation of TW patent  
application No. 91121854

optical disc drive similar must be continuous and  
uninterrupted. If only one link breaks down, the writing  
process fails, thus the recordable disc has to be discarded.  
Furthermore, by contrast between audio/video play mode and  
5 the copy mode, the optical disc drive can use a slower  
rotation speed to read the data from the disc and to write  
into the buffer in copy mode. Therefore, during the reread  
step of copy mode, the optical disc drive not only has more  
buffer data in the buffer for output but also reduces the  
10 rotation speed to reread data.

According to the invention, the method for preventing  
read errors in an optical disc drive sets particular read  
process based on different data read modes to reduce data  
read errors, to assist smooth audio output, and copy data  
15 accurately.

A detailed description is given in the following  
embodiments with reference to the accompanying drawings.

#### DESCRIPTION OF THE DRAWINGS

- Fig. 1 is a block diagram of a disc servo system;  
20 Fig. 2 is a flow diagram of a conventional read  
procedure of an optical disc drive;  
Fig. 3 is a flow diagram of an embodiment of the  
present invention; and  
Fig. 4 is a flow diagram of another embodiment of the  
25 present invention.

#### SYMBOLS

10-disc

12-RF IC

11-optical head

30 13-microprocessor

Header. :91039

Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121851

14~focusing servo

5 18~tracking actuator

15~tracking servo

19~sled motor

16~spindle motor servo

20~spindle motor

17~focusing actuator

### EMBODIMENTS

A disc in the embodiments of this invention is a music  
10 CD or a video CD as an example. The data in a music CD or a  
video CD lacks error correction to cause difficulty during  
data retrieving, and generates more reading error. Somehow,  
the minor reading error can be accepted without received by  
user as sound break, mosaic image or stopped image. Of  
15 course, no error in the data flow would be better.  
Nevertheless, during coping files, the optical disc drive is  
allowed to have more time for reading correct data from the  
CD. This more time for reading can be achieved by reducing  
the rotation speed of the music/video CD.

20 Fig. 3 is a flowchart shows an embodiment of the  
present invention for preventing reading error. From a  
start mode (step START), a disc is inserted in the optical  
disc drive and a read mode is decided. First, read mode of  
the optical disc drive is determined if it is an audio/video  
25 play mode (step S11). If the optical disc drive is in an  
audio/video play mode, the following steps are performed:  
reading the data from the disc (step S12); recognizing that  
the data as read is unacceptable and stored data in the  
buffer is more than requirement (step S13); rereading the  
30 data from the disc (step S12); otherwise, the data is  
compulsorily written into the buffer (S14) and output  
therefrom (S15).



Header. : 91039

Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121854

As well, if the read mode is not an audio/video play mode (step S11), determined if it is a copy mode (step S16). If the optical disc drive is in the copy mode, the following steps are performed: reading the data from the disc (step S17); recognizing if the data as read is unacceptable and stored data in the buffer is more than requirement (step S18), reducing the rotation speed of the optical disc drive (S19); rereading the data from the disc (step S17); otherwise, the data is compulsorily written into the buffer (S14) and output therefrom (S15).

The audio/video play mode and the copy mode differ in that a copy speed of CD burner is much lower than a reading speed of optical disc drive; thus a bigger buffer is acceptable, that is in copy mode, the optical disc drive allows more reread steps to read data from the optical disc correctly. However, in audio/video play mode, the optical disc drive reads disc in a fixed speed, the buffer in audio/video play mode is smaller than that in copy mode to prevent sound break, reread steps are reduced, and read speed of the optical disc drive is not decreased.

In the embodiment described above, one of the critical conditions for rereading the data is where the buffer has sufficient data. The number of reread steps can also be used to determine whether the data is reread, wherein the number of reread steps in audio/video play mode is lower than that in copy mode.

Another embodiment of the invention is described herein, as shown in Fig. 4, which is a flowchart thereof. From a start mode (step START), a disc is inserted in the optical disc drive and a read mode is decided. First, read

Header. : 91039

Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121854

mode of the optical disc drive is determined if it is an  
audio/video play mode (step S21). If the optical disc drive  
is in an audio/video play mode, the following steps are  
performed: reading the audio/video data from the disc (step  
5 S22); recognizing that the data as read is unacceptable and  
the number of reread steps is less than a predetermined  
limit (step S23); rereading the data from the disc (step  
S22); otherwise, the data is compulsorily written into the  
buffer (S24) and output therefrom (S25).

10 As well, if the read mode is not an audio/video play  
mode (step S21), determined if it is a copy mode (step S26).  
If the optical disc drive is in the copy mode, the following  
steps are performed: reading the data from the disc (step  
S27); recognizing that the data as read is unacceptable and  
15 the number of reread steps is less than a predetermined  
limit (step S28), reducing the rotation speed of the optical  
disc drive (S29); rereading the data from the disc (step  
S27), wherein in copy mode, higher predetermined limit is  
allowable, thus, the predetermined limit in copy mode is  
20 much higher than that in audio/video play mode; otherwise,  
if the data is correctly read or the reread steps reaches  
the predetermined limit, the data is compulsorily written  
into the buffer (S24) and output therefrom (S25).

In the second embodiment, reread step limit is added as  
25 critical conditions for rereading the data to prevent  
transmission break.

While the invention has been described by way of  
example and in terms of the preferred embodiments, it is to  
be understood that the invention is not limited to the  
30 disclosed embodiments. To the contrary, it is intended to

Header. :91039

Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121854

cover various modifications and similar arrangements (as  
would be apparent to those skilled in the art). Therefore,  
the scope of the appended claims should be accorded the  
broadest interpretation so as to encompass all such  
5 modifications and similar arrangements.

Header. :91039  
Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121854

What is claimed is:

1. A method for preventing data reading error, the method comprising:

determining a read mode;

5 if the read mode is an audio/video play mode, executing a first read procedure to read the data on the disk;

if the read mode is a read mode, executing a second read procedure to read the data on the disk; and  
10 outputting the data.

2. The method as claimed in claim 1, wherein the first read procedure comprises:

reading the data from the disc;

writing the data into a buffer; and

15 outputting the data from the buffer.

3. The method as claimed in claim 2, wherein, the first read procedure further comprises:

20 rereading the data from the disc when the data as read is recognized as unacceptable and stored data in the buffer is more than requirement; when the data is read correctly or the buffer has an insufficient amount of data for output, the data is compulsorily written into the buffer and output therefrom to be play.

25 4. The method as claimed in claim 2, wherein, the first read procedure further comprises:

Header. :91039

Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121854

5 rereading the data from the disc when the data as read  
is recognized as unacceptable and stored data in  
the buffer is more than requirement; when the  
data is read correctly or a reread steps over a  
predetermined limit, the data output to be play  
to prevent play break.

5. The method as claimed in claim 1, wherein the  
second read procedure comprises:

10 reading the data from the disc;  
writing the data into a buffer; and  
outputting the data from the buffer.

6. The method as claimed in claim 5, wherein, the  
second read procedure further comprises:

15 rereading the data from the disc when the data as read  
is recognized as unacceptable and stored data in  
the buffer is more than requirement; when the  
data is read correctly or the buffer has an  
insufficient amount of data for output, the data  
is compulsorily written into the buffer and  
20 output therefrom to be copy.

7. The method as claimed in claim 5, wherein, the  
second read procedure further comprises:

25 rereading the data from the disc when the data as read  
is recognized as unacceptable and stored data in  
the buffer is more than requirement; when the  
data is read correctly or a reread steps over a  
predetermined limit, the data output to be copy  
to prevent copy break.

Header. : 91039  
Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121854

8. The method as claimed in claim 6 or 7, wherein the second read procedure further comprises a step of reducing a rotation speed of the disc before the step of rereading the data on the disc.

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Header. : 91039  
Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121854

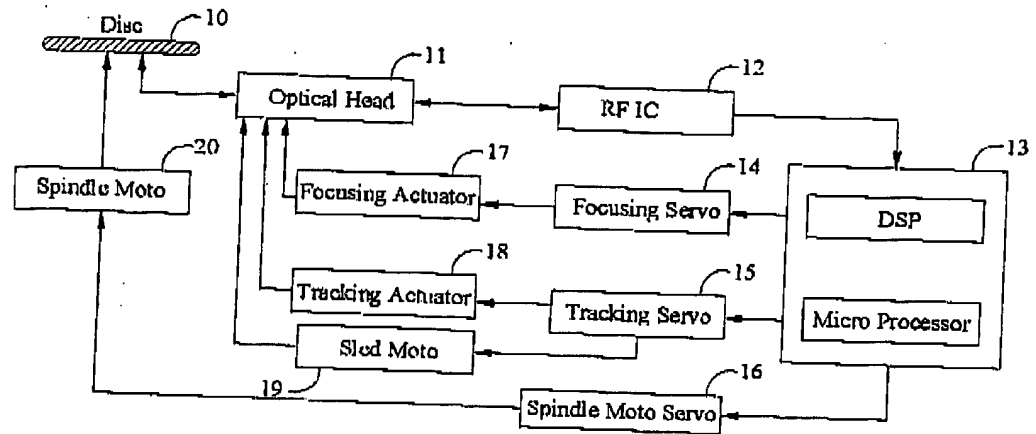


FIG. 1 (PRIOR ART)

Header. : 91039  
Our ref: 0660-8318-US/literal translation of TW patent  
application No. 91121854

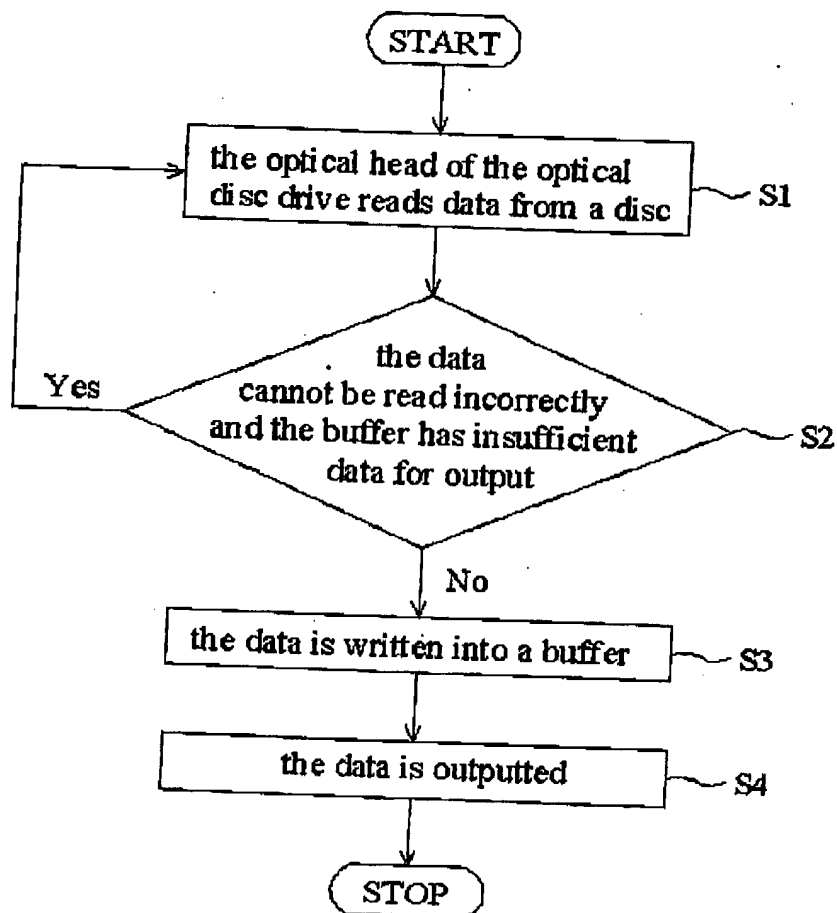


FIG. 2 (PRIOR ART)



Header. :91039

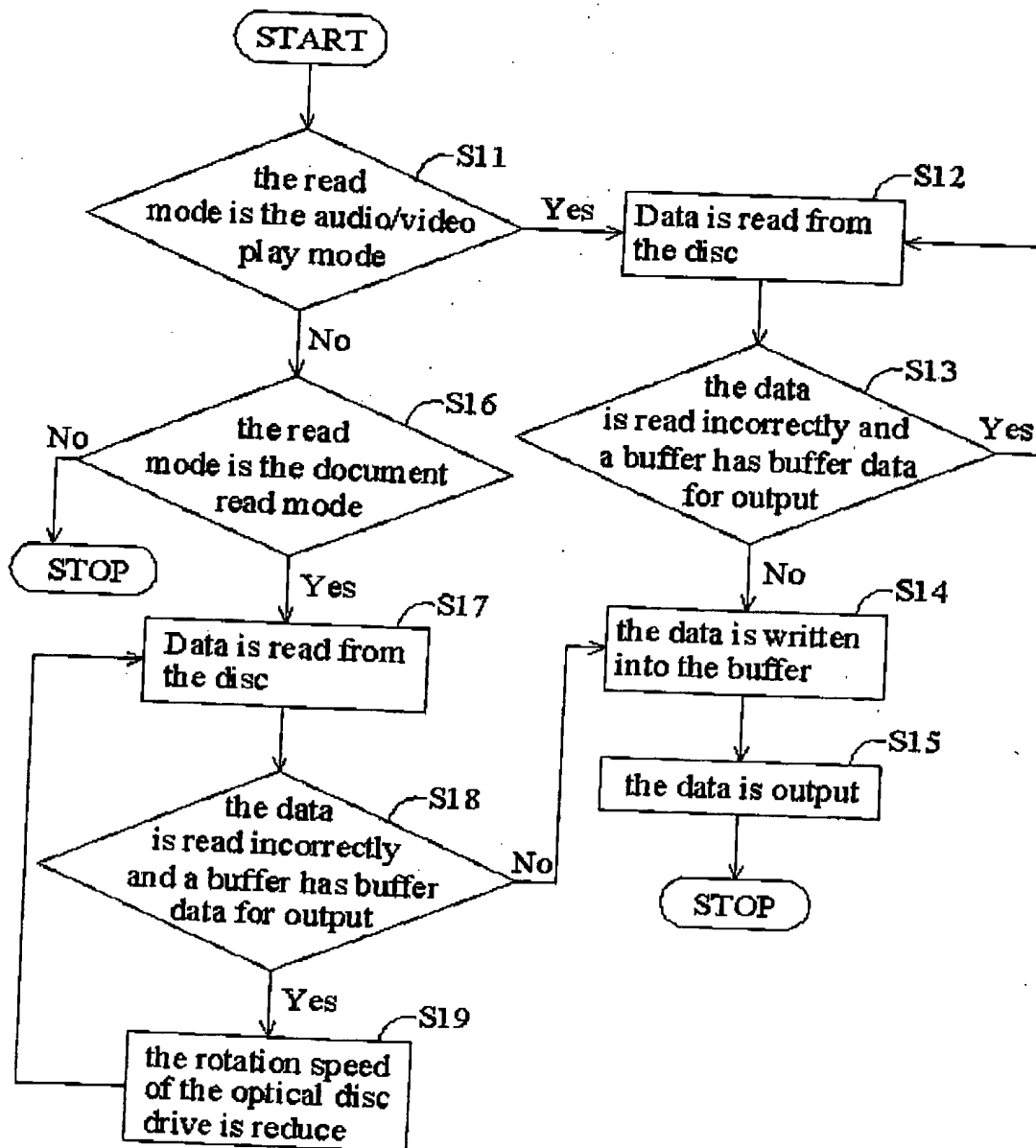
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application No. 91121854

FIG. 3

Header. : 91039

Our ref: 0660-8318-US/literal translation of TW patent application No. 91121854

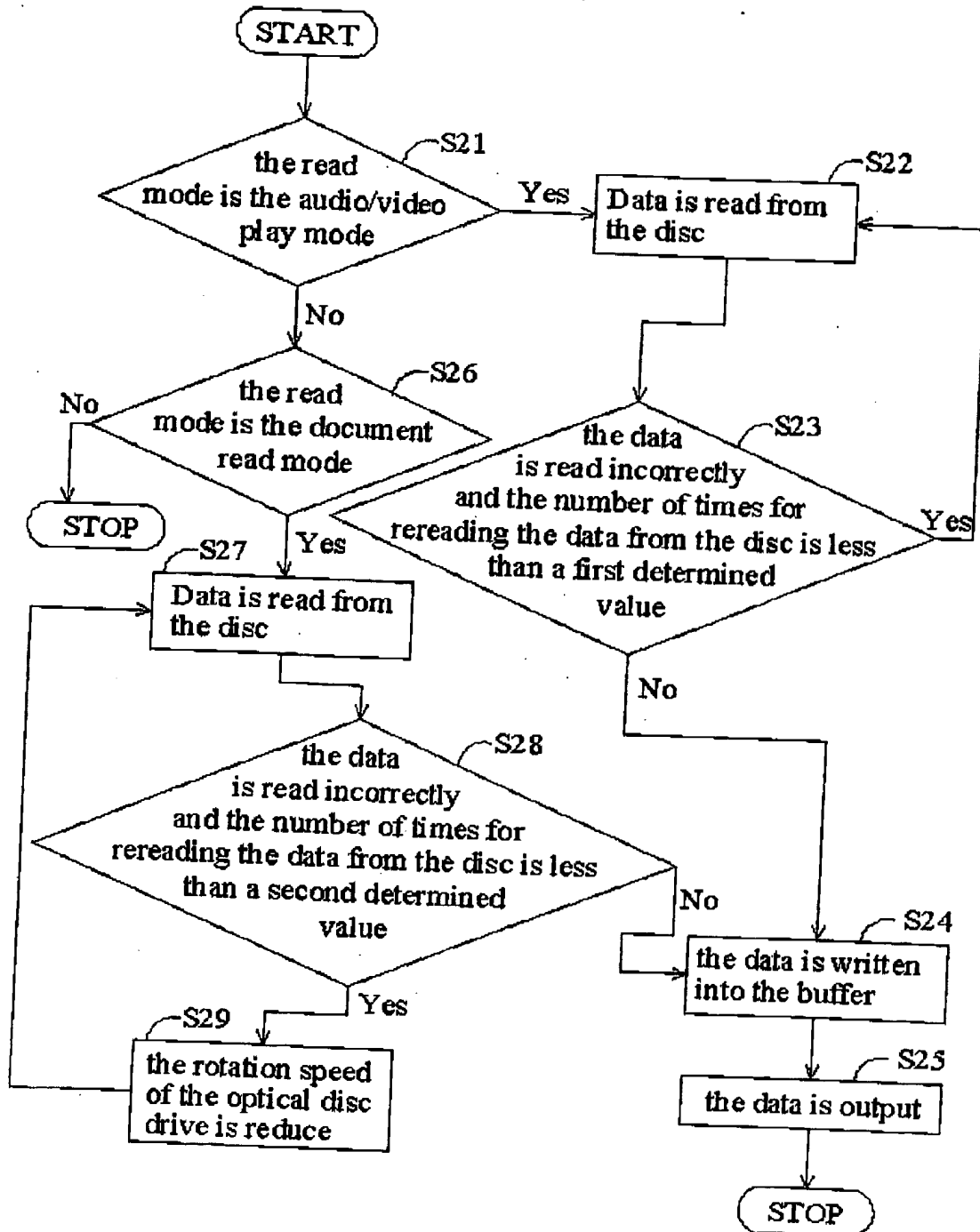


FIG. 4